11/7 Recitation

1. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & -1 \\ -1 & 0 & 0 \end{bmatrix}$.

   (a) Diagonalize A; that is, find matrices P and D satisfying $A = PDP^{-1}$ by hand. Use the Julia code in the **Julia12Diagonalization** notebook to check your work.

   (b) Find a formula for A^k

2. Recall that we used the fact that A and A^T have the same eigenvalues in the proof that Markov matrices have an eigenvalue of 1. Let's prove this.
   (a) Show that A and A^T have the same characteristic polynomial; that is, show $\det(A - \lambda I) = \det(A^T - \lambda I)$.

   (b) Deduce that A and A^T have the same eigenvalues.

3. True/False. If a statement is true, prove it. If it is false, provide a counterexample.
   (a) Similar matrices have the same determinant.

   (b) If A is not invertible, then it is not diagonalizable.

4. Complete Problem 1 in the **Julia12Diagonalization** notebook.

5. Do the coding exercises in the **Julia12Diagonalization** notebook.